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10/791,140	03/02/2004	Ge Wang	21087.0026U2	3175

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EXAMINER	
LUONG, PETER	

ART UNIT	PAPER NUMBER
3737	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/791,140	WANG ET AL.	
	Examiner	Art Unit	
	Peter Luong	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-90* is/are pending in the application.

4a) Of the above claim(s) *31-90* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/30/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warren et al. (Warren et al., “Combined Ultrasound and Fluorescence Spectroscopy for Physico-Chemical Imaging of Atherosclerosis”. IEEE Transactions on Biomedical

Engineering 42(2) (1995): 121-132) in view of Tomography – Definition from Dictionary.com.

5. With respect to claims 1 and 16, the publication of Warren et al. discloses a method and system for reconstructing a bioluminescent source distribution within an object (abstract, line 1) comprising imaging the object using a first imaging modality (page 125, col. 1, lines 12-13) to produce a first reconstructed image (figure 2, image reconstructed on oscilloscope), mapping optical properties (optical properties found on page 123, section B, lines 1-4) of the object to the first reconstructed image (page 126, col. 1, lines 54-58, data mapped to pixels), and detecting optical signals emitted from the object using an optical imaging modality (page 124, col. 2, lines 15-17) to produce a bioluminescent source distribution (page 126, col. 1, lines 54-58), based on the mapped optical properties (page 126, col. 1, lines 54-58). Warren et al. also discloses a library of optical properties of the object (page 122, col. 2, lines 45-47 and Table 1) and a processor for mapping the optical properties of the object to the first reconstructed image (PC, figure 2).

6. Warren et al. does not teach the first imaging modality is a tomographic imaging modality. However, ultrasound is a well known tomographic imaging modality (see definition of tomography). Warren et al. only teaches A-mode imaging however B-mode imaging (tomographic ultrasound) is well known in the art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the imaging modality of Warren et al. to a tomographic imaging modality as a substitution of one imaging modality for another is well within the skill level of one of ordinary skill in the art.

7. With respect to claims 2 and 17, Warren et al. discloses wherein the first reconstructed image shows two or three dimensional structural details of the object (A-mode image, page 125, col. 1, lines 12-13).

8. With respect to claims 3, 5, 9, 18, 20, and 24, Warren et al. discloses wherein the bioluminescent source distribution shows cross-sectional or volumetric views of the object or quantitative features of underlying source distributions of the object (page 122, col. 1, lines 27-30).

9. With respect to claims 4 and 19, Warren et al. discloses wherein the bioluminescent source distribution is reconstructed to represent multiple types of source distributions with various spectral characteristics (it is inherent that there would be multiple sources for a cross-sectional image to be reconstructed, page 122, col. 1, lines 27-30, furthermore, it is also inherent for the sources to have varying spectral characteristics, such as wavelengths).

10. With respect to claims 6 and 21, Warren et al. discloses wherein the bioluminescent source distribution is reconstructed using an iterative or analytical approach (page 123, section C).

11. With respect to claim 7 and 22, Warren et al. discloses wherein the step of detecting optical signals uses sensors (page 124, col. 2, lines 15-17).

12. With respect to claims 8 and 23, Warren et al. discloses wherein the step of detecting optical signals also uses optical path components (page 124, col. 2, lines 28-30).

13. With respect to claims 10 and 25, Warren et al. discloses wherein the optical properties include at least one of absorption coefficients, scattering coefficients,

scattering anisotropy, indices of refraction, and features of underlying sources (page 123, section B, lines 1-4, and Table 1 shows scattering coefficients).

14. With respect to claims 11 and 26, Warren et al. discloses wherein the first imaging modality includes at least one of x-ray computed tomography, micro computed tomography, magnetic resonance imaging, and ultrasound (page 125, col. 1, lines 12-13).

15. With respect to claims 12 and 27, Warren et al. discloses wherein the optical imaging modality includes at least one bioluminescent tomography and fluorescent tomography (page 124, col. 2, lines 15-17).

16. With respect to claims 13 and 28, Warren et al. discloses segmenting the first reconstructed image into regions (A-mode imaging, page 125, col. 1, lines 12-13), wherein the step of mapping maps the optical properties to each segmented region of the image (page 126, col. 1, lines 54-58, mapped to pixels).

17. With respect to claim 14 and 29, Warren et al. discloses registering the first reconstructed image with the detected optical signals before producing the second reconstructed image (page 126, col. 1, lines 54-58).

18. With respect to claims 15 and 30, Warren et al. discloses wherein the step of registration uses a landmark-based method, a landmark free method, or an optical surface imager method (the catheter images the interior surface of an artery, page 125, col. 1, line 22-23).

19. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend et al. (US 6,490,476).

20. With respect to claims 1 and 16, the patent of Townsend et al. discloses a method and system for reconstructing an image of an object (abstract) comprising imaging the object using a tomographic imaging modality (12) to produce a first reconstructed image (col. 13, lines 22-24), mapping optical properties (optical properties found on col. 13, lines 24-25) of the object to the reconstructed image volume (it is well known in the art that CT images are mappings of optical properties, col. 13, lines 22-24), and detecting optical signals emitted from the object using a second imaging modality (14) to produce a bioluminescent source distribution (col. 13, lines 31-32), based on the mapped optical properties (col. 13, lines 29-32). Townsend et al. also discloses a library of optical properties of the object (col. 22, lines 54-56) and a processor for mapping the optical properties of the object to the first reconstructed image (col. 13, line 23).

21. Townsend does not teach an optical imaging modality. However, Townsend teaches that CT/SPECT devices are well known and requires the same optical properties correction as CT/PET devices (col. 3, line 63 to col. 4, line 38). Single Photon Emission Computed Tomography (SPECT) is a known technique using a gamma camera which captures gamma rays (photons; form of electromagnetic radiation or light emission). Therefore, a SPECT system is interpreted to be an optical imaging modality.

22. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the imaging modality of Townsend for the optical imaging modality (SPECT) as the substitution of one imaging modality for another is within the skill level of one of ordinary skill in the art.

23. With respect to claims 2 and 17, Townsend et al. discloses wherein the first reconstructed image shows two or three dimensional structural details of the object (figure 5a).

24. With respect to claims 3, 5, 9, 18, 20, and 24, Townsend et al. discloses wherein the second reconstructed image shows cross-sectional or volumetric views of the object or quantitative features of underlying source distributions of the object (figure 12b).

25. With respect to claim 4 and 19, Townsend et al. discloses wherein the second reconstructed image is reconstructed for multiple types of source distributions with various spectral characteristics (col. 16, lines 48-52).

26. With respect to claims 6 and 21, Townsend et al. discloses wherein the second reconstructed image is reconstructed using an iterative or analytical approach (col. 13, lines 45-48).

27. With respect to claim 7 and 22, Townsend et al. discloses wherein the step of detecting optical signals uses sensors (12, col. 12, lines 37-40).

28. With respect to claims 8 and 23, Townsend et al. discloses wherein the step of detecting optical signals also uses optical path components (collimated detectors, col. 16, lines 48-52).

29. With respect to claims 10 and 25, Townsend et al. discloses wherein the optical properties include at least one of absorption coefficients, scattering coefficients, scattering anisotropy, indices of refraction, and features of underlying sources (col. 13, lines 24-25 and 29-30).

30. With respect to claims 11 and 26, Townsend et al. discloses wherein the first imaging modality includes at least one of x-ray computed tomography, micro computed tomography, magnetic resonance imaging, and ultrasound (12).

31. With respect to claims 12 and 27, Townsend et al. discloses wherein the second imaging modality includes at least one bioluminescent tomography and fluorescent tomography (14).

32. With respect to claims 13 and 28, Townsend et al. discloses segmenting the first reconstructed image into regions (col. 17, lines 24-27).

33. With respect to claims 14 and 29, Townsend et al. discloses registering the first reconstructed image with the detected optical signals before producing the second reconstructed image (col. 13, lines 22-30).

34. With respect to claims 15 and 30, Townsend et al. discloses wherein the step of registrating uses a landmark-based method, a landmark free method, or an optical surface imager method (col. 10, lines 28-30).

Response to Arguments

Applicant's arguments filed 4/30/2008 have been fully considered but they are not persuasive.

Applicant argues that Warren does not teach an optical property. However, the Examiner respectfully disagrees with the applicant. Applicant has failed to provide a special definition and meaning to the term “optical property” therefore claim terminology is given its broadest reasonable interpretation. Therefore, any optical characteristic, e.g. power or intensity, can reasonably be interpreted to be an optical property. Furthermore, the Examiner cited page 123, column 1, section B as a mere example of

an optical property disclosed by Warren. Warren discloses many optical properties found throughout the disclosure, i.e. indices of refraction (page 123, column 2, 2nd paragraph).

With respect to applicant's arguments that Warren does not teach a library of optical properties, the Examiner respectfully disagrees. The Examiner points the applicant to page 123, column 2, 2nd paragraph where Warren discloses "optical properties of concentrated rhodamine B were measured in out laboratory, while human aorta optical properties were taken from Keijzer [22]". Therefore, Warren discloses optical properties that were measured previously.

With respect to applicant's arguments that Warren does not teach a bioluminescent source distribution based on the mapping of optical properties to a first reconstructed image, the Examiner respectfully disagrees. However, applicant's arguments are directed toward a recitation which is not claimed. In the instant application, the claimed subject matter is directed to a bioluminescent source distribution based on the mapped optical properties. Thus, using broadest reasonable interpretation, the limitation of "based on the mapped optical properties" is interpreted to mean "using the same optical properties that were mapped to the first reconstructed image".

With respect to applicant's arguments that Townsend does not teach mapping optical properties of the object to the first reconstructed image, the Examiner respectfully disagrees. Applicant has failed to provide a special definition and meaning to the term "optical property" therefore claim terminology is given its broadest reasonable interpretation. The Examiner interprets attenuation to be an optical property

as it affects the photon as it passes through a medium. Furthermore, a CT scan is an image representing the attenuation of a photon through an object (mapping of features of the object).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter Luong whose telephone number is (571)270-1609. The examiner can normally be reached on Monday - Friday, 9:30 a.m. - 6:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on (571) 272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ruth S. Smith/
Primary Examiner, Art Unit 3737

/P. L./
Examiner, Art Unit 3737